



<b>Name:</b>	Schröder, Tom
<b>Institution:</b>	Jülich Supercomputing Center, Research Center Jülich
<b>Email address</b>	to.schroeder@fz-juelich.de

<b>TITLE: Optimizing the numerical scheme of 3-D root water uptake models</b>
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**ABSTRACT**

To assess the spatial and temporal variability of water flow, solute transport and uptake of water at the plant scale, 3-D modeling approaches based on a detailed description of the soil heterogeneity and the root architecture are needed. Recently, improvements have been made in such 3D models to describe local root water uptake at the interface between soil and root. However, such models are computationally very demanding and their application at large scale with multiple plants or large rooting systems are limited due to computational time. Further improvements are therefore needed to optimize the numerical scheme in terms of computational time and memory use.

Several possibilities have been tested to optimize the code. First, the core matrix to be solved can be upgraded by coupling root and soil system in one matrix instead of two separated matrices as in the previous releases. Second, we investigated the possibility to solve our system parallel. Third, the usage of adaptive or parallel adaptive grids to gain accuracy and decrease the computational time is studied. The current developments and possibilities using the 3D soil-root flow model R-SWMS are eventually discussed.